FIGURE 1
(Prior Art)

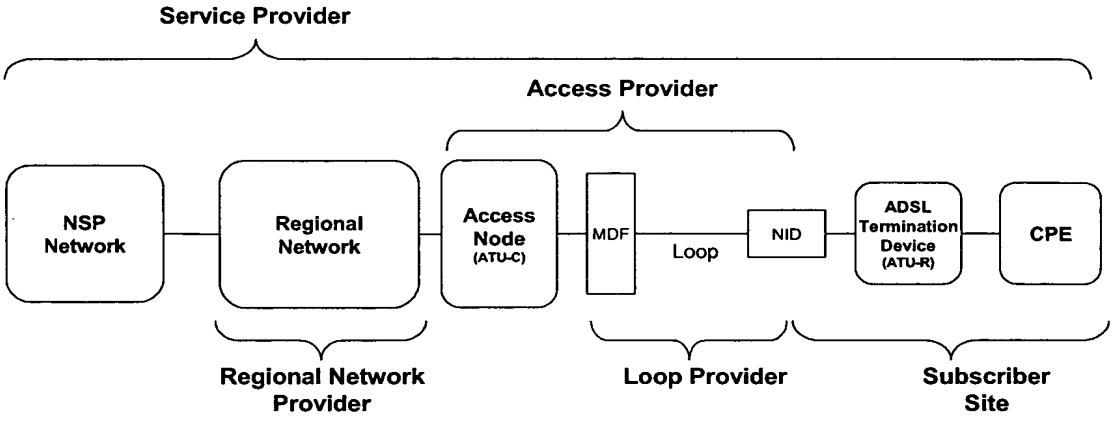


FIGURE 2
(Prior Art)

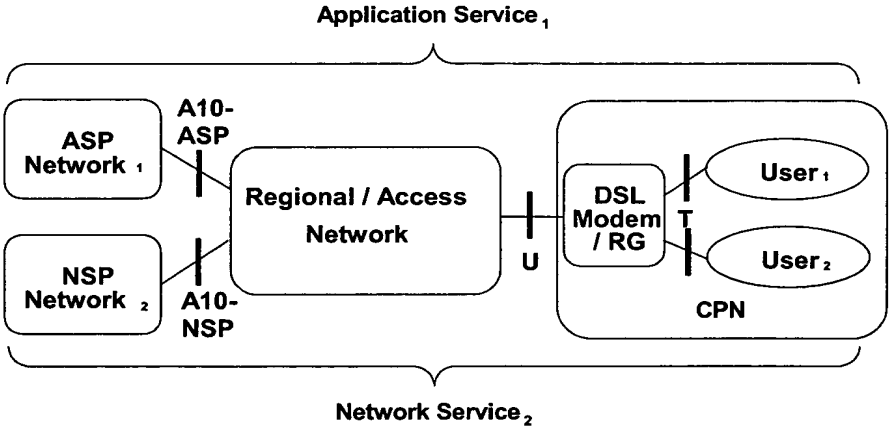


FIGURE 3
(Prior Art)

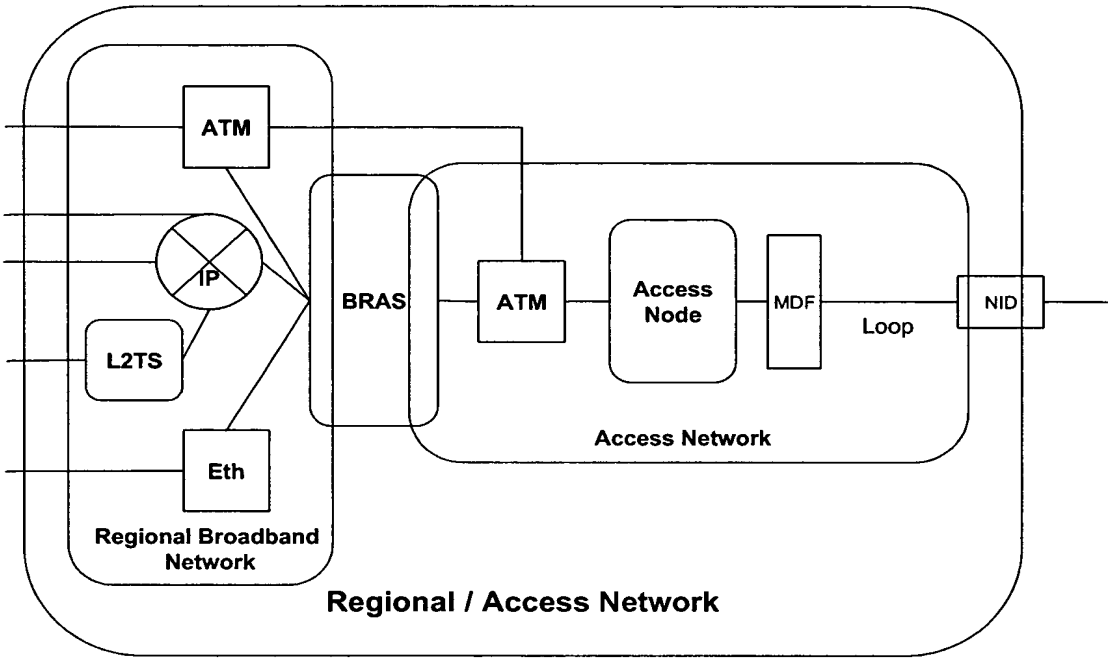


FIGURE 4
(Prior Art)

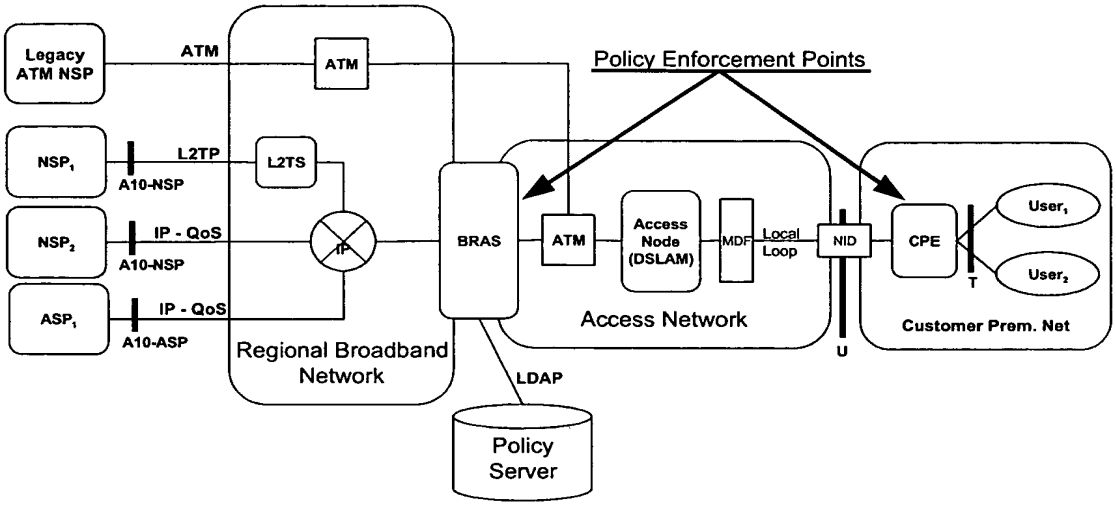


FIGURE 5

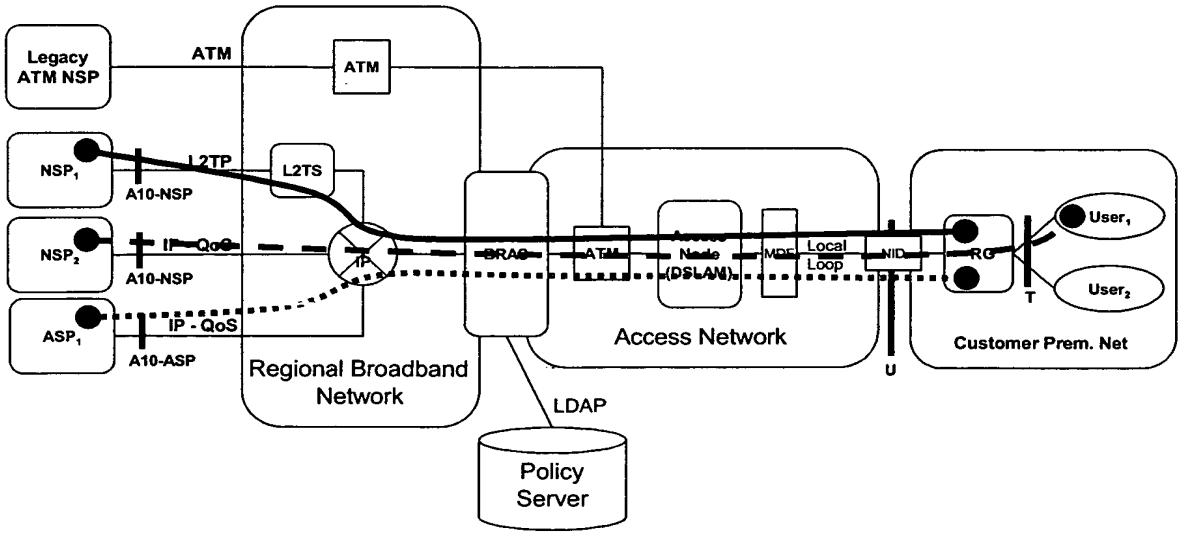


FIGURE 6

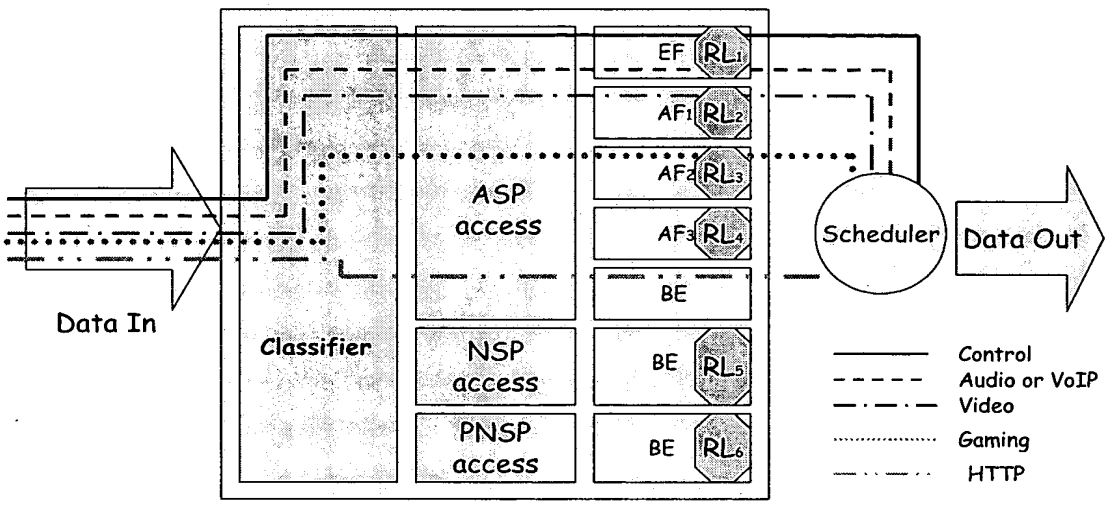


FIGURE 7

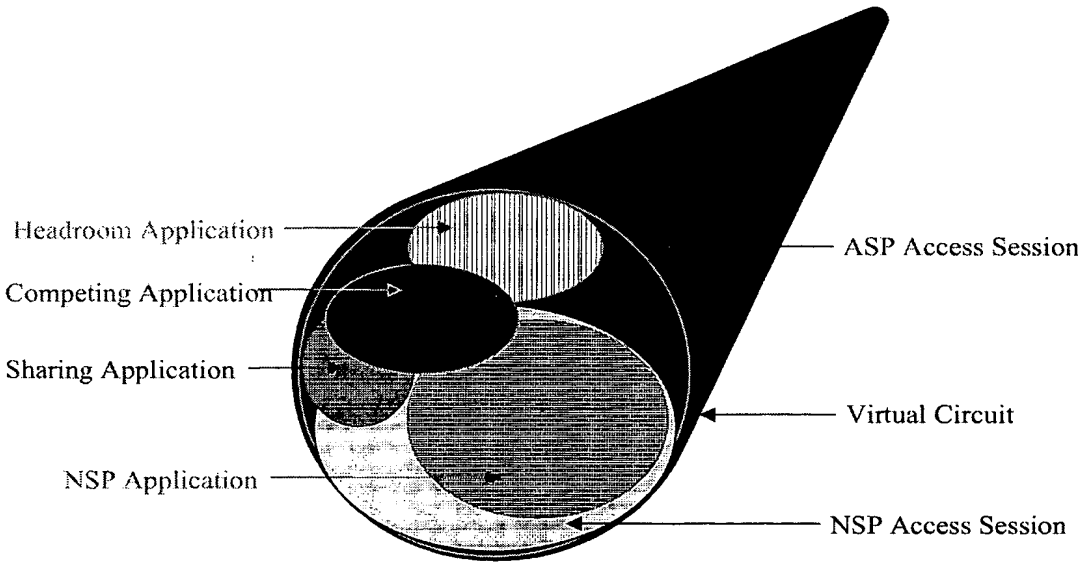
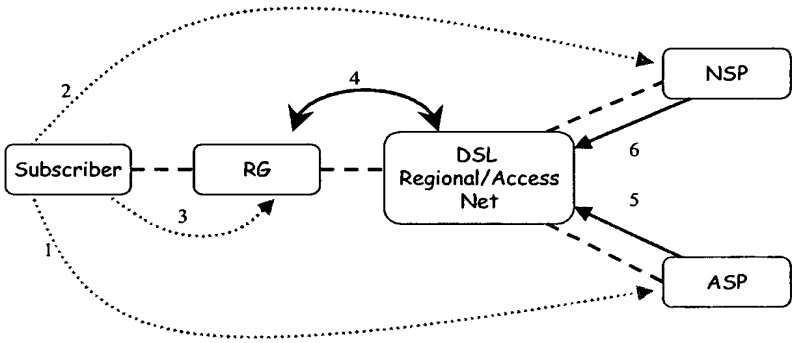


FIGURE 8



900

FIGURE 9

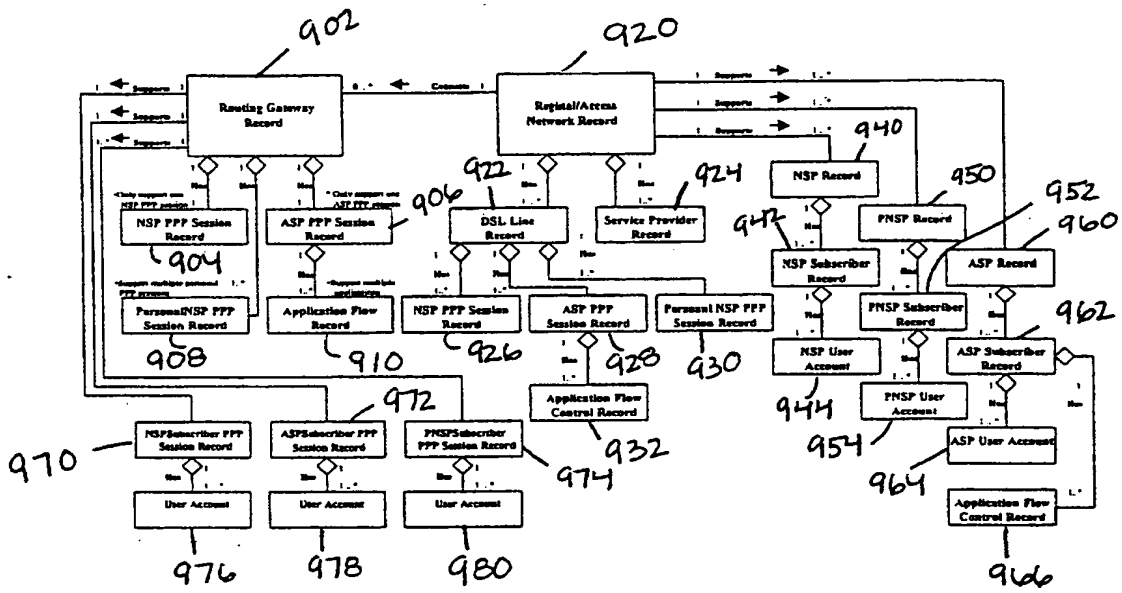

902
920
Routing Gateway Record
Regional/Access Network Record
940
922
924
906
NSP Record
950
952
NSP PPP Session Record
ASP PPP Session Record
DSL Line Record
Service Provider Record
PNSP Record
960
904
NSP Subscriber Record
ASP Record
PersonalNSP PPP Session Record
Application Flow Record
NSP PPP Session Record
ASP PPP Session Record
Personal NSP PPP Session Record
PNSP Subscriber Record
962
908
910
926
928
930
NSP User Account
ASP Subscriber Record
944
Application Flow Control Record
PNSP User Account
954
932
970
972
NSPSubscriber PPP Session Record
ASPSubscriber PPP Session Record
PNSPSubscriber PPP Session Record
974
ASP User Account
964
User Account
User Account
User Account
Application Flow Control Record
976
978
980
966

FIGURE 10

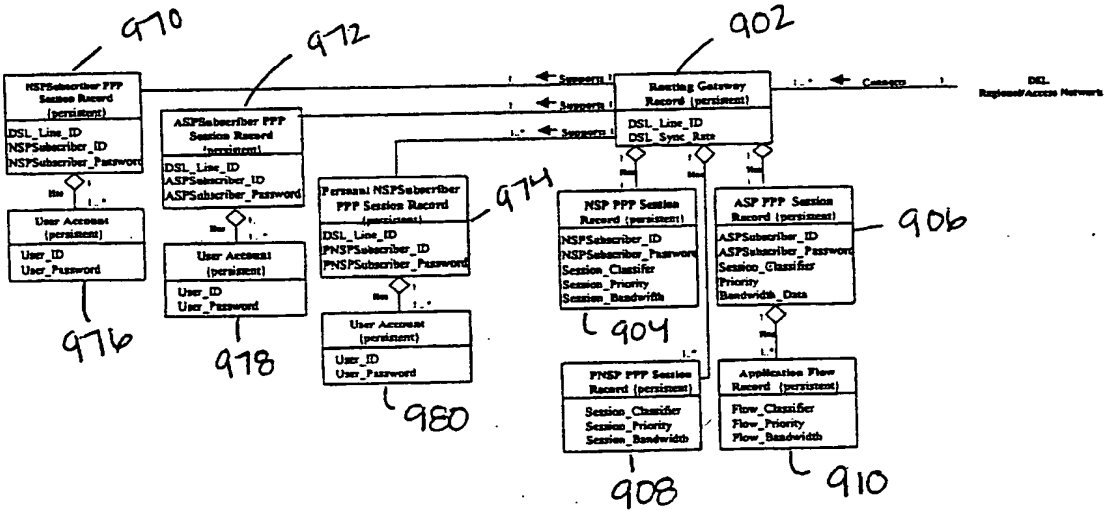

970
972
902
974
904
906
908
910
976
978
980
Routing Gateway Record (persistent)
DSL_Line_ID
DSL_Sync_Rate
NSP PPP Session Record (persistent)
ASP PPP Session Record (persistent)
Persistent NSPSubscriber PPP Session Record (persistent)
PNSP PPP Session Record (persistent)
Application Flow Record (persistent)
User Account (persistent)
User_ID
User_Password

FIGURE 11

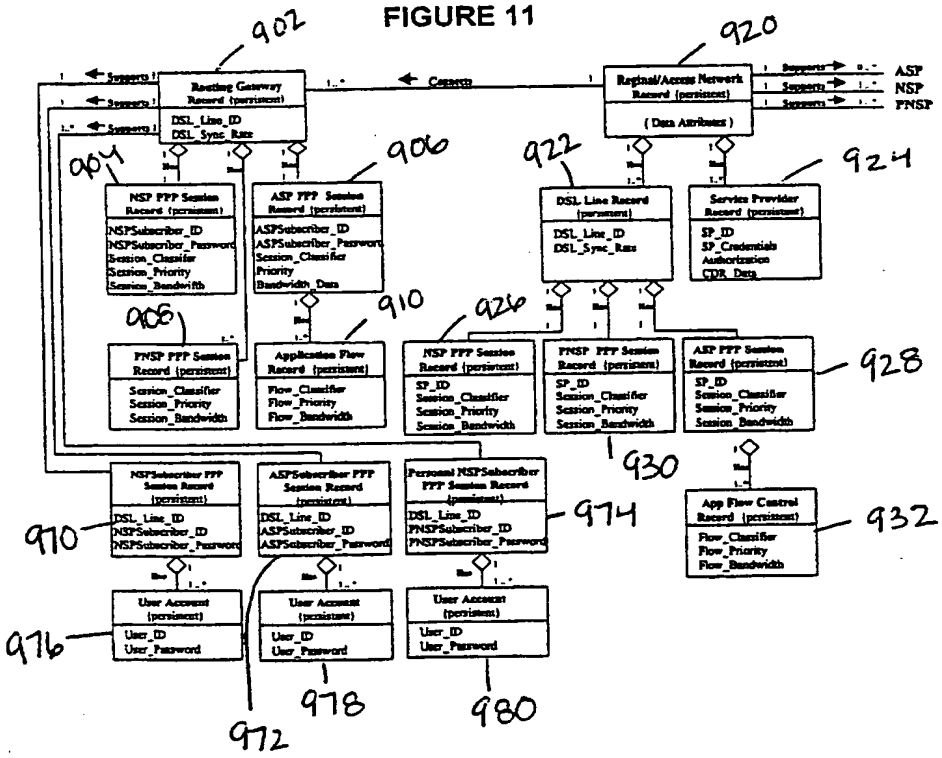

902
920
Routing Gateway Record (persistent)
DSL_Line_ID
DSL_Sync_Rate
Regional/Access Network Record (persistent)
(Data Attributes)
Supports
Connects
ASP
NSP
PNSP
904
906
922
924
NSP PPP Session Record (persistent)
NSPSubscriber_ID
NSPSubscriber_Password
Session_Classifier
Session_Priority
Session_Bandwidth
ASP PPP Session Record (persistent)
ASPSubscriber_ID
ASPSubscriber_Password
Session_Classifier
Priority
Bandwidth_Data
DSL Line Record (persistent)
DSL_Line_ID
DSL_Sync_Rate
Service Provider Record (persistent)
SP_ID
SP_Credentials
Authorization
CDR_Data
908
910
926
928
PNSP PPP Session Record (persistent)
Session_Classifier
Session_Priority
Session_Bandwidth
Application Flow Record (persistent)
Flow_Classifier
Flow_Priority
Flow_Bandwidth
NSP PPP Session Record (persistent)
SP_ID
Session_Classifier
Session_Priority
Session_Bandwidth
PNSP PPP Session Record (persistent)
SP_ID
Session_Classifier
Session_Priority
Session_Bandwidth
ASP PPP Session Record (persistent)
SP_ID
Session_Classifier
Session_Priority
Session_Bandwidth
930
NSPSubscriber PPP Session Record (persistent)
DSL_Line_ID
NSPSubscriber_ID
NSPSubscriber_Password
ASPSubscriber PPP Session Record (persistent)
DSL_Line_ID
ASPSubscriber_ID
ASPSubscriber_Password
Personal NSPSubscriber PPP Session Record (persistent)
DSL_Line_ID
PNSPSubscriber_ID
PNSPSubscriber_Password
App Flow Control Record (persistent)
Flow_Classifier
Flow_Priority
Flow_Bandwidth
910
974
932
User Account (persistent)
User_ID
User_Password
User Account (persistent)
User_ID
User_Password
User Account (persistent)
User_ID
User_Password
976
978
980
972

FIGURE 12

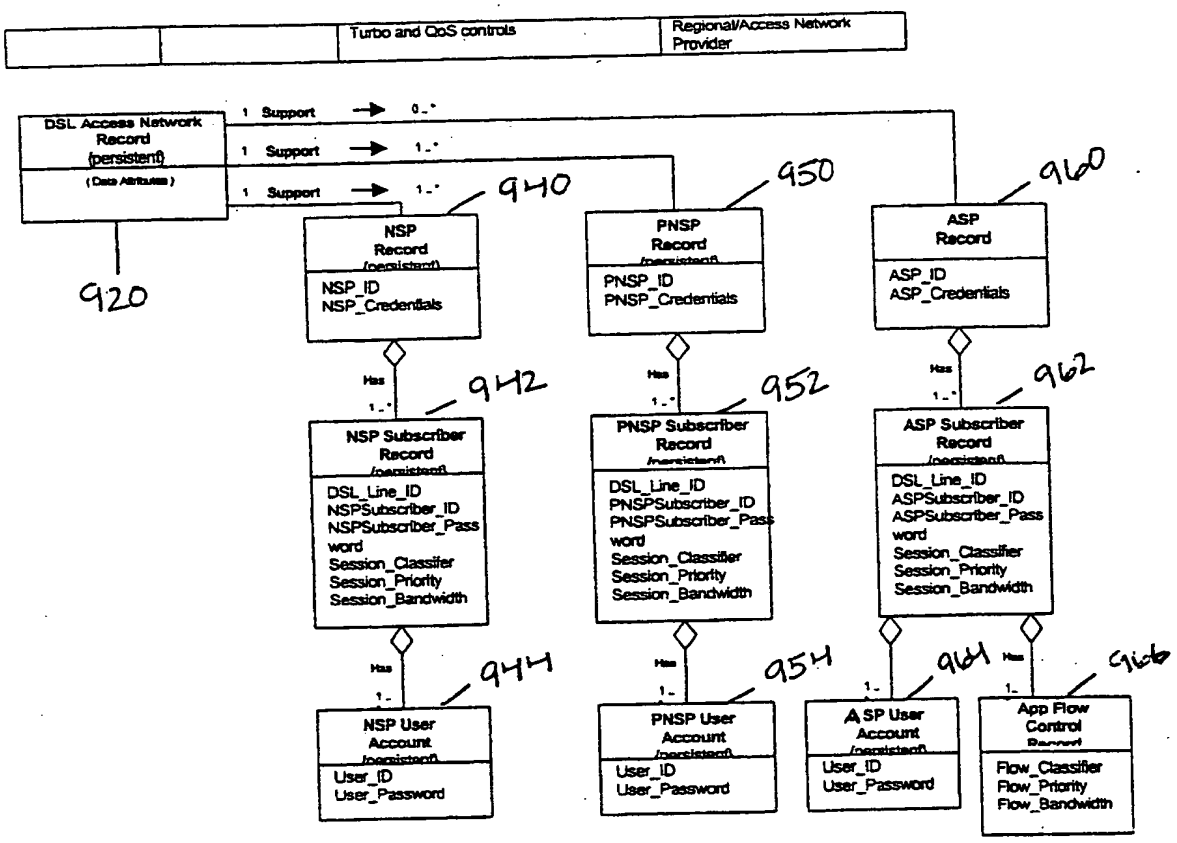

Turbo and QoS controls
Regional/Access Network Provider
DSL Access Network Record (persistent)
(Data Attributes)
1 Support 0..*
1 Support 1..*
1 Support 1..*
920
NSP Record (persistent)
NSP_ID
NSP_Credentials
940
PNSP Record (persistent)
PNSP_ID
PNSP_Credentials
950
ASP Record
ASP_ID
ASP_Credentials
960
Has 1..*
NSP Subscriber Record (persistent)
DSL_Line_ID
NSPSubscriber_ID
NSPSubscriber_Password
Session_Classifer
Session_Priority
Session_Bandwidth
942
PNSP Subscriber Record (persistent)
DSL_Line_ID
PNSPSubscriber_ID
PNSPSubscriber_Password
Session_Classifer
Session_Priority
Session_Bandwidth
952
ASP Subscriber Record (persistent)
DSL_Line_ID
ASPSubscriber_ID
ASPSubscriber_Password
Session_Classifer
Session_Priority
Session_Bandwidth
962
Has 1..
NSP User Account (persistent)
User_ID
User_Password
944
PNSP User Account (persistent)
User_ID
User_Password
954
ASP User Account (persistent)
User_ID
User_Password
964
App Flow Control Record
Flow_Classifier
Flow_Priority
Flow_Bandwidth
966

FIGURE 13

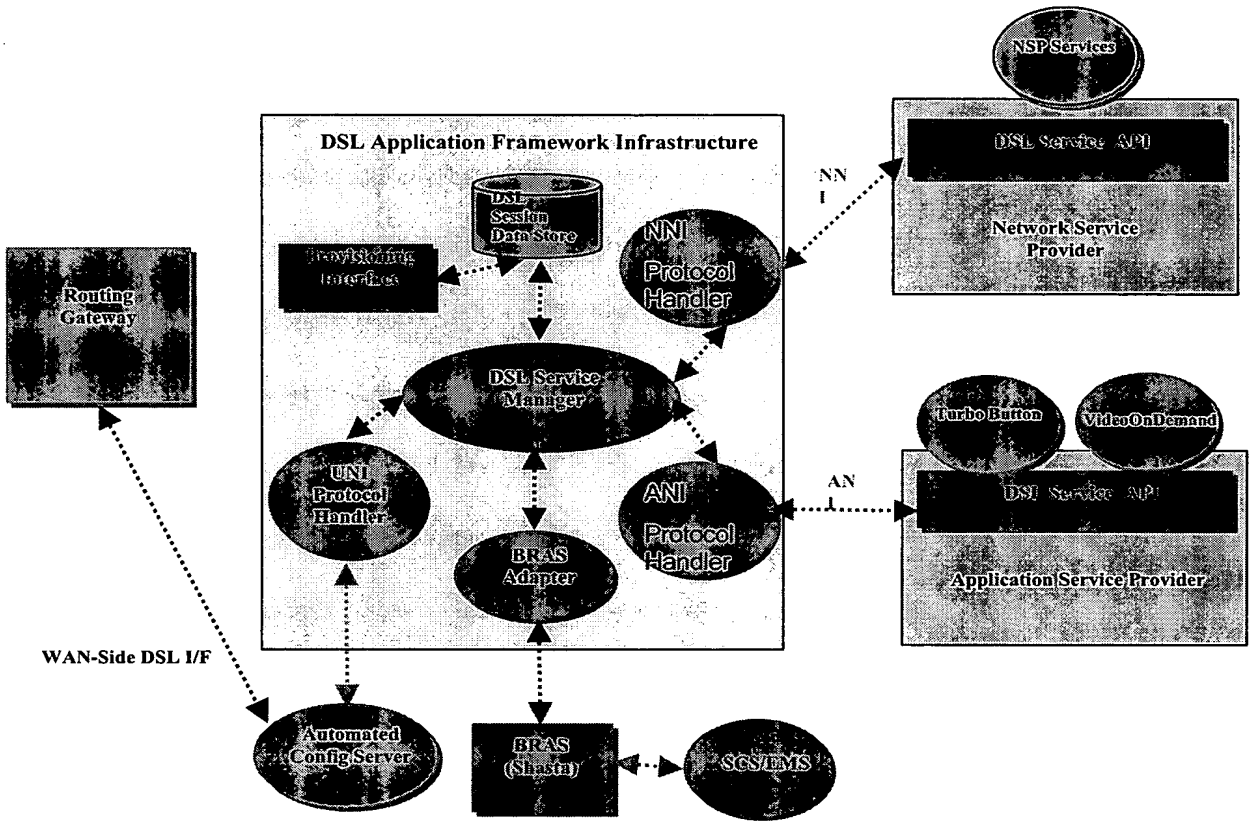

NSP Services
DSL Service API
Network Service Provider
NNI
DSL Application Framework Infrastructure
DSL Session Data Store
Provisioning Interface
NNI Protocol Handler
Routing Gateway
DSL Service Manager
UNI Protocol Handler
ANI Protocol Handler
BRAS Adapter
AN
I
Turbo Button
VideoOnDemand
DSL Service API
Application Service Provider
WAN-Side DSL I/F
Automated Config Server
BRAS (Shasta)
SCS/EMS

FIGURE 14

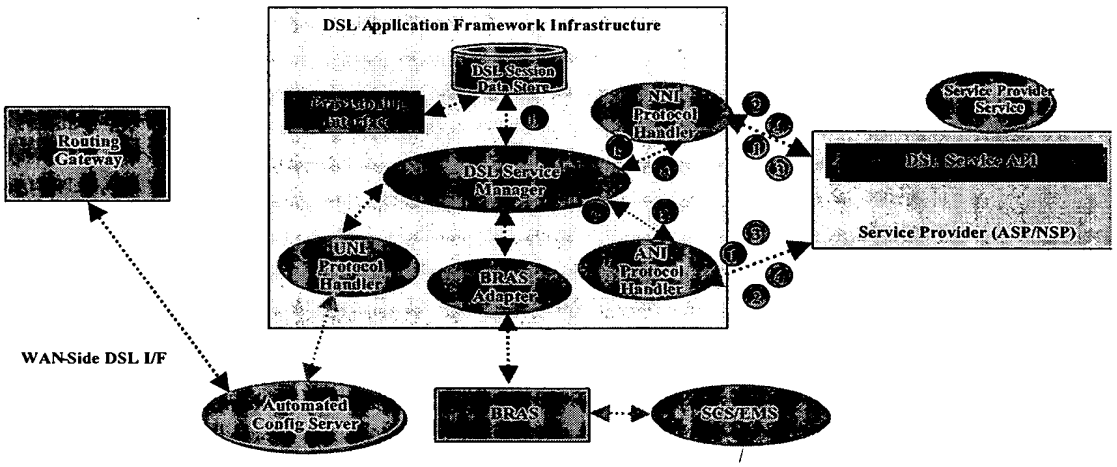


FIGURE 15

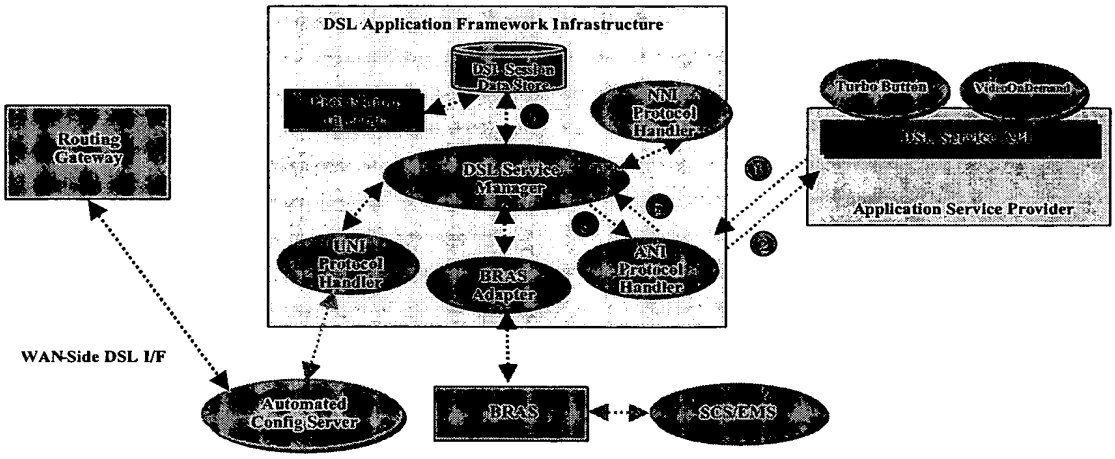


FIGURE 16

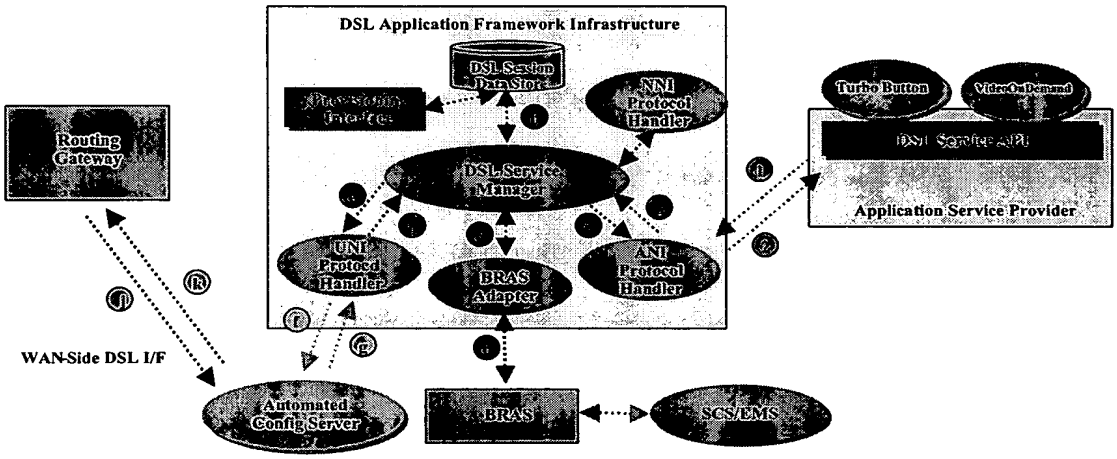


FIGURE 17

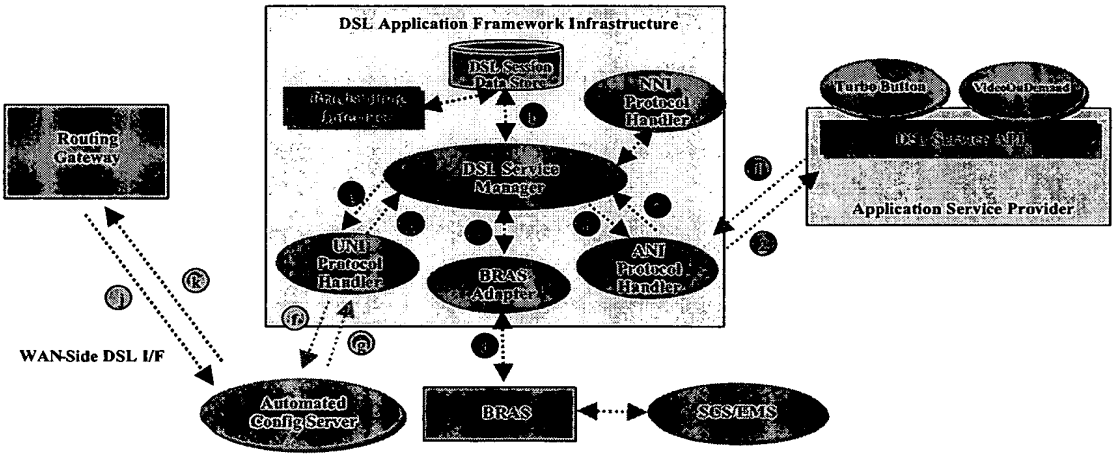


FIGURE 18

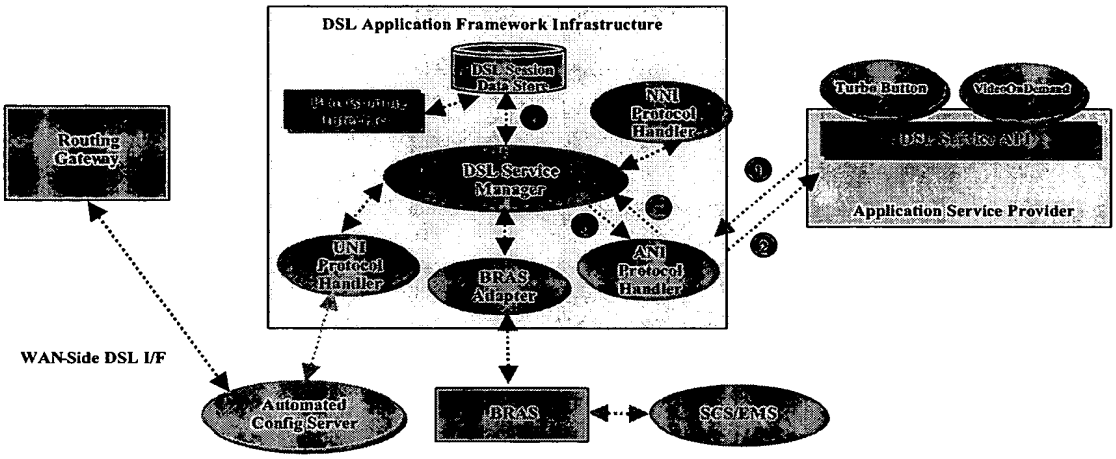


FIGURE 19

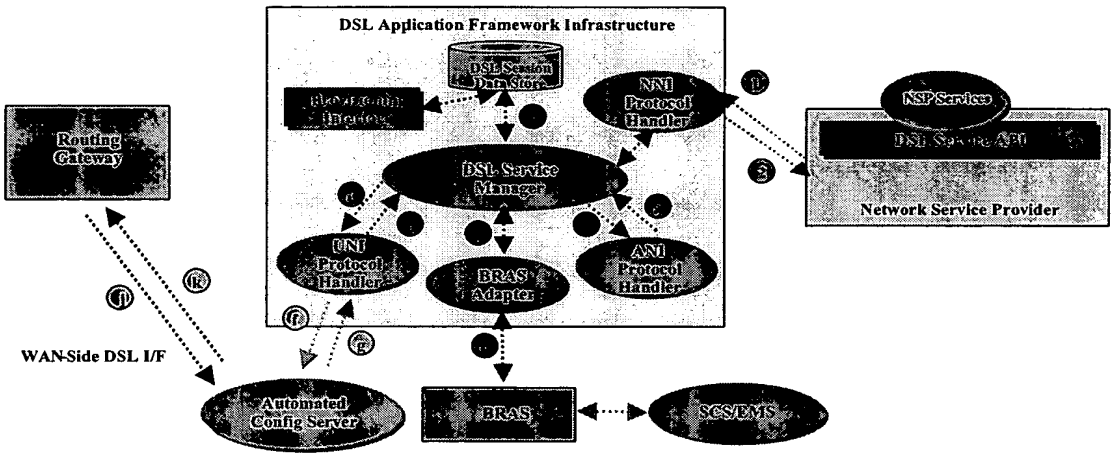


FIGURE 20

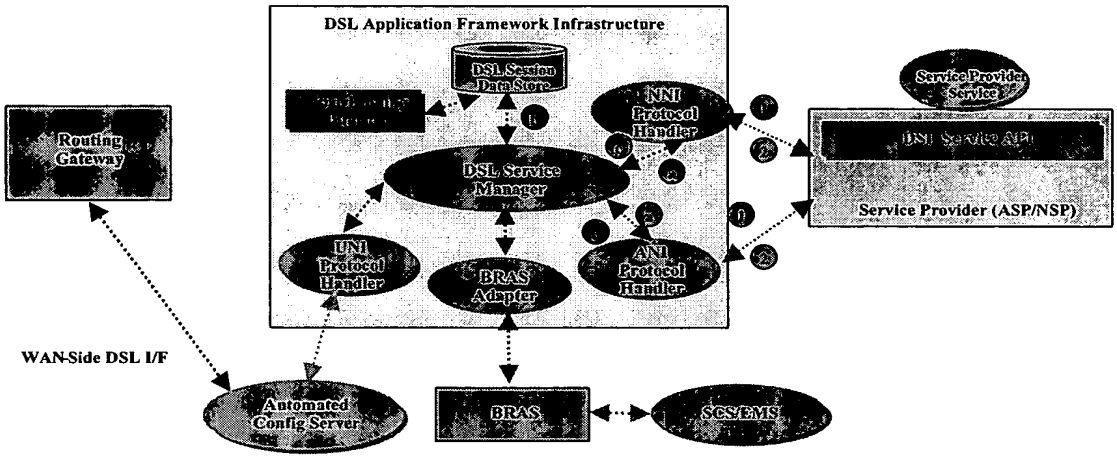


FIGURE 21

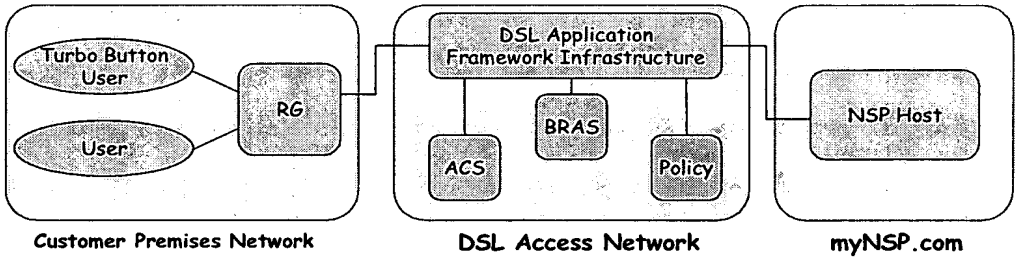


FIGURE 22

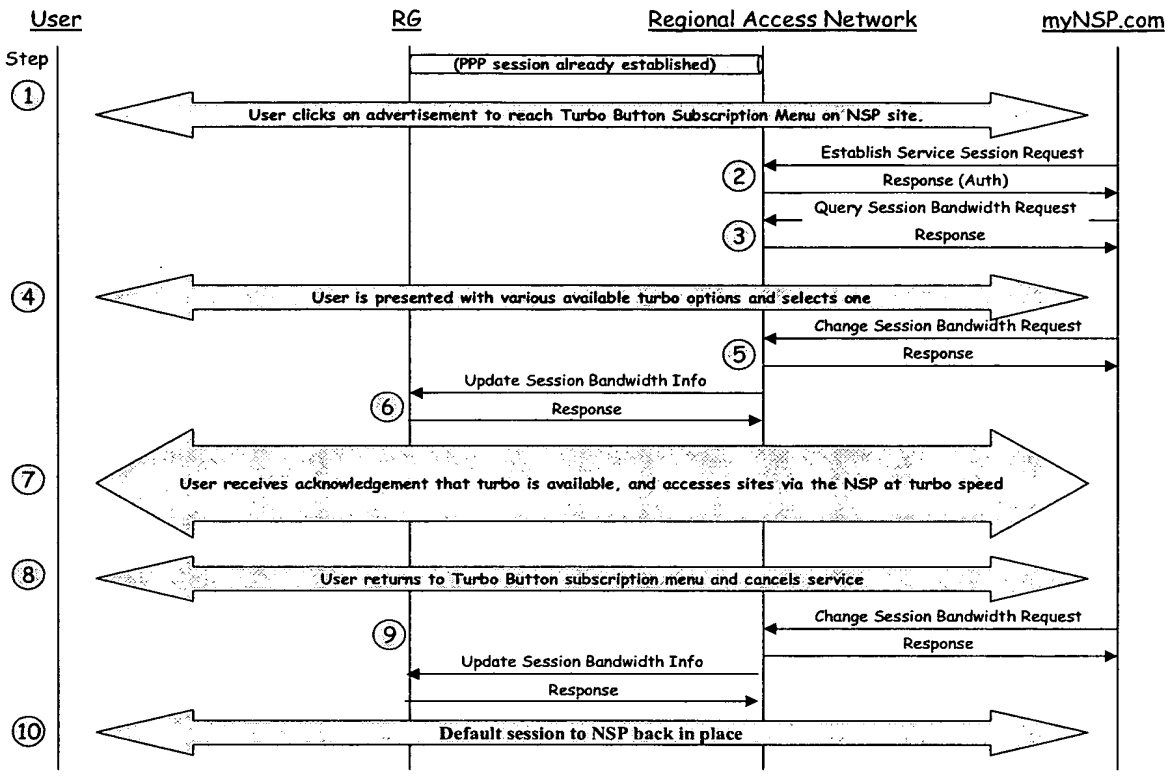

User
RG
Regional Access Network
myNSP.com
Step
(PPP session already established)
1
User clicks on advertisement to reach Turbo Button Subscription Menu on NSP site.
Establish Service Session Request
2
Response (Auth)
Query Session Bandwidth Request
3
Response
4
User is presented with various available turbo options and selects one
Change Session Bandwidth Request
5
Response
Update Session Bandwidth Info
6
Response
7
User receives acknowledgement that turbo is available, and accesses sites via the NSP at turbo speed
8
User returns to Turbo Button subscription menu and cancels service
Change Session Bandwidth Request
9
Response
Update Session Bandwidth Info
Response
10
Default session to NSP back in place

FIGURE 23

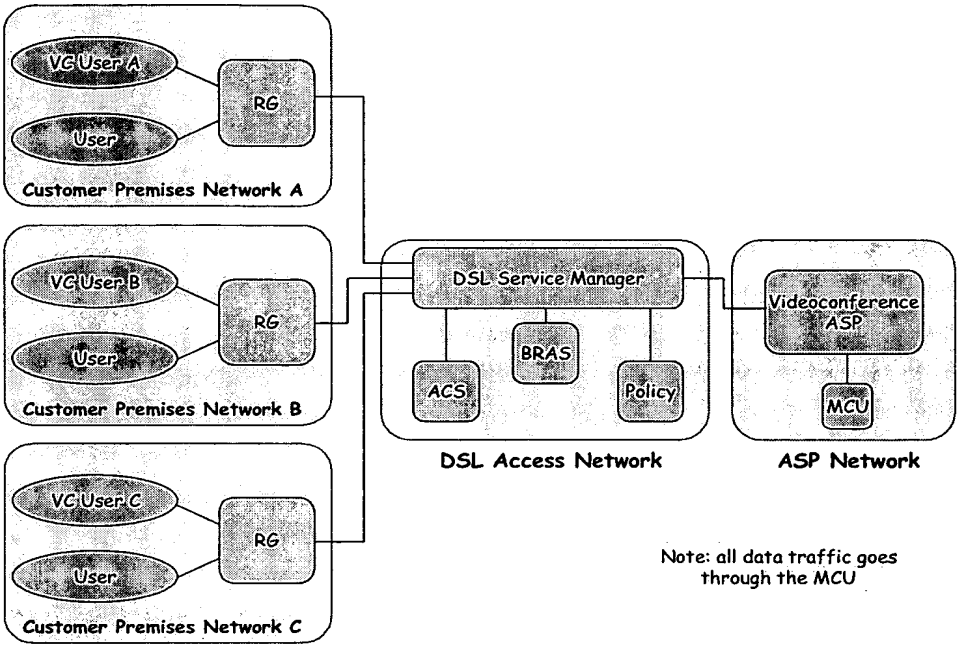

VC User A
User
RG
Customer Premises Network A
VC User B
User
RG
Customer Premises Network B
VC User C
User
RG
Customer Premises Network C
DSL Service Manager
BRAS
ACS
Policy
DSL Access Network
Videoconference ASP
MCU
ASP Network
Note: all data traffic goes through the MCU

FIGURE 24

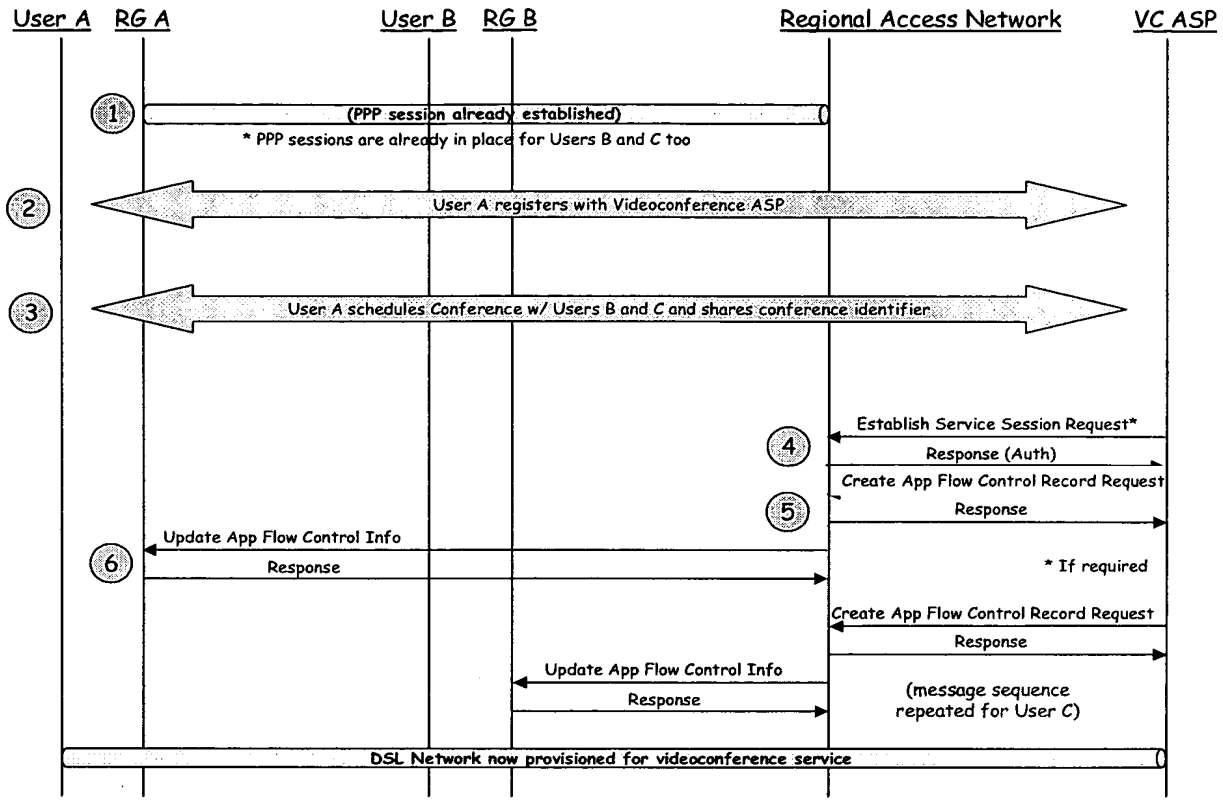

User A
RG A
User B
RG B
Regional Access Network
VC ASP
1
(PPP session already established)
* PPP sessions are already in place for Users B and C too
2
User A registers with Videoconference ASP
3
User A schedules Conference w/ Users B and C and shares conference identifier
4
Establish Service Session Request*
Response (Auth)
5
Create App Flow Control Record Request
Response
6
Update App Flow Control Info
Response
* If required
Create App Flow Control Record Request
Response
Update App Flow Control Info
Response
(message sequence repeated for User C)
DSL Network now provisioned for videoconference service

FIGURE 25

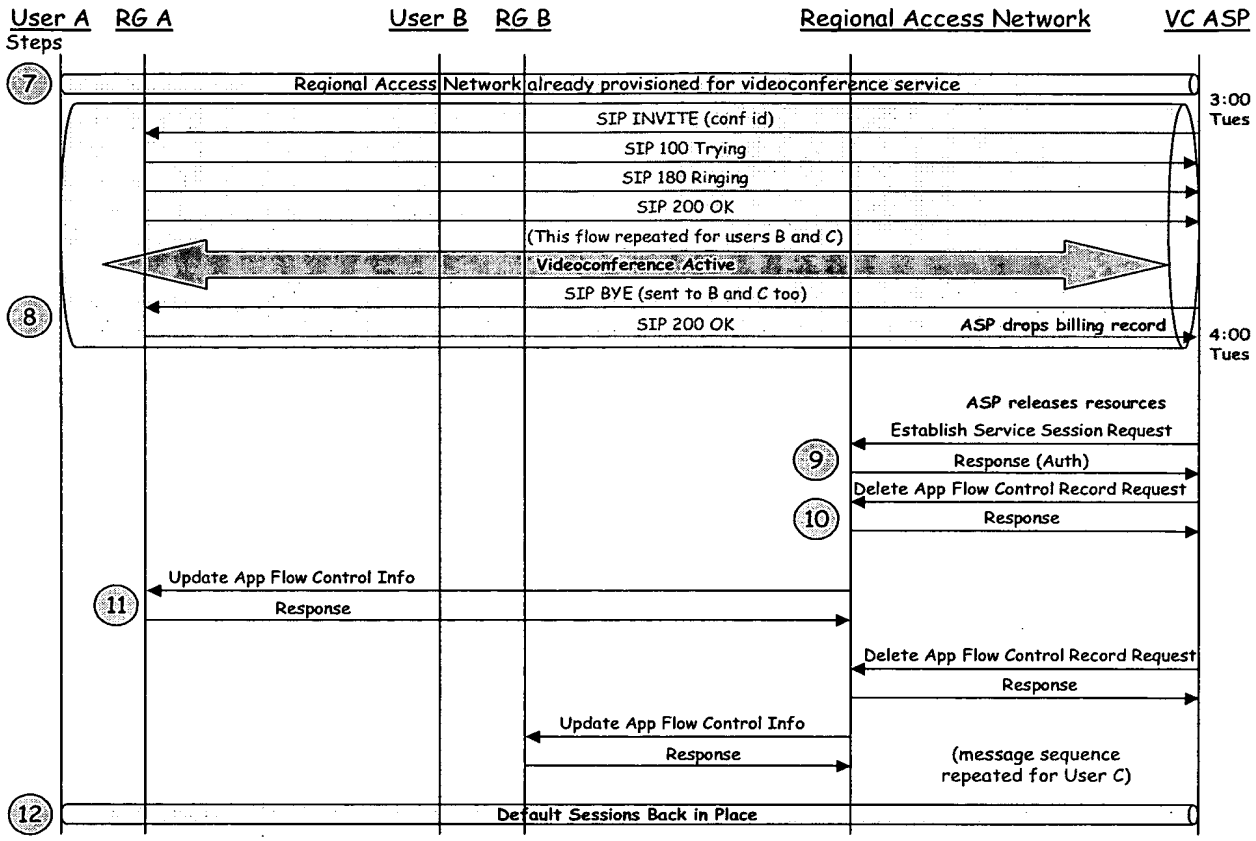

User A
RG A
User B
RG B
Regional Access Network
VC ASP
Steps
7
Regional Access Network already provisioned for videoconference service
3:00 Tues
SIP INVITE (conf id)
SIP 100 Trying
SIP 180 Ringing
SIP 200 OK
(This flow repeated for users B and C)
Videoconference Active
SIP BYE (sent to B and C too)
8
SIP 200 OK
ASP drops billing record
4:00 Tues
ASP releases resources
Establish Service Session Request
9
Response (Auth)
Delete App Flow Control Record Request
10
Response
Update App Flow Control Info
11
Response
Delete App Flow Control Record Request
Response
Update App Flow Control Info
Response
(message sequence repeated for User C)
12
Default Sessions Back in Place

FIGURE 26

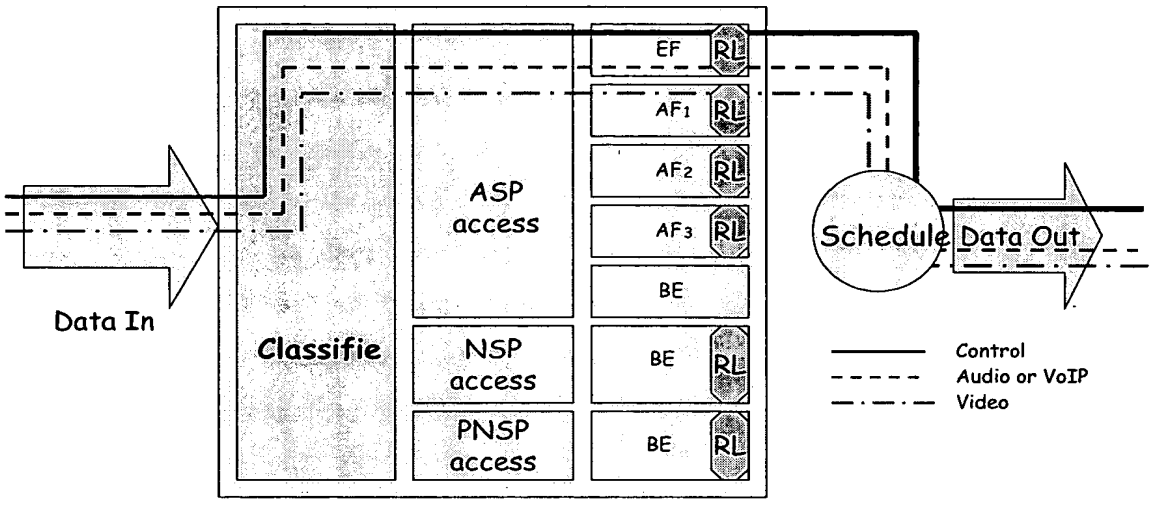

Data In
Classifie
ASP access
NSP access
PNSP access
EF
AF1
AF2
AF3
BE
BE
BE
RL
Schedule
Data Out
Control
Audio or VoIP
Video

FIGURE 27

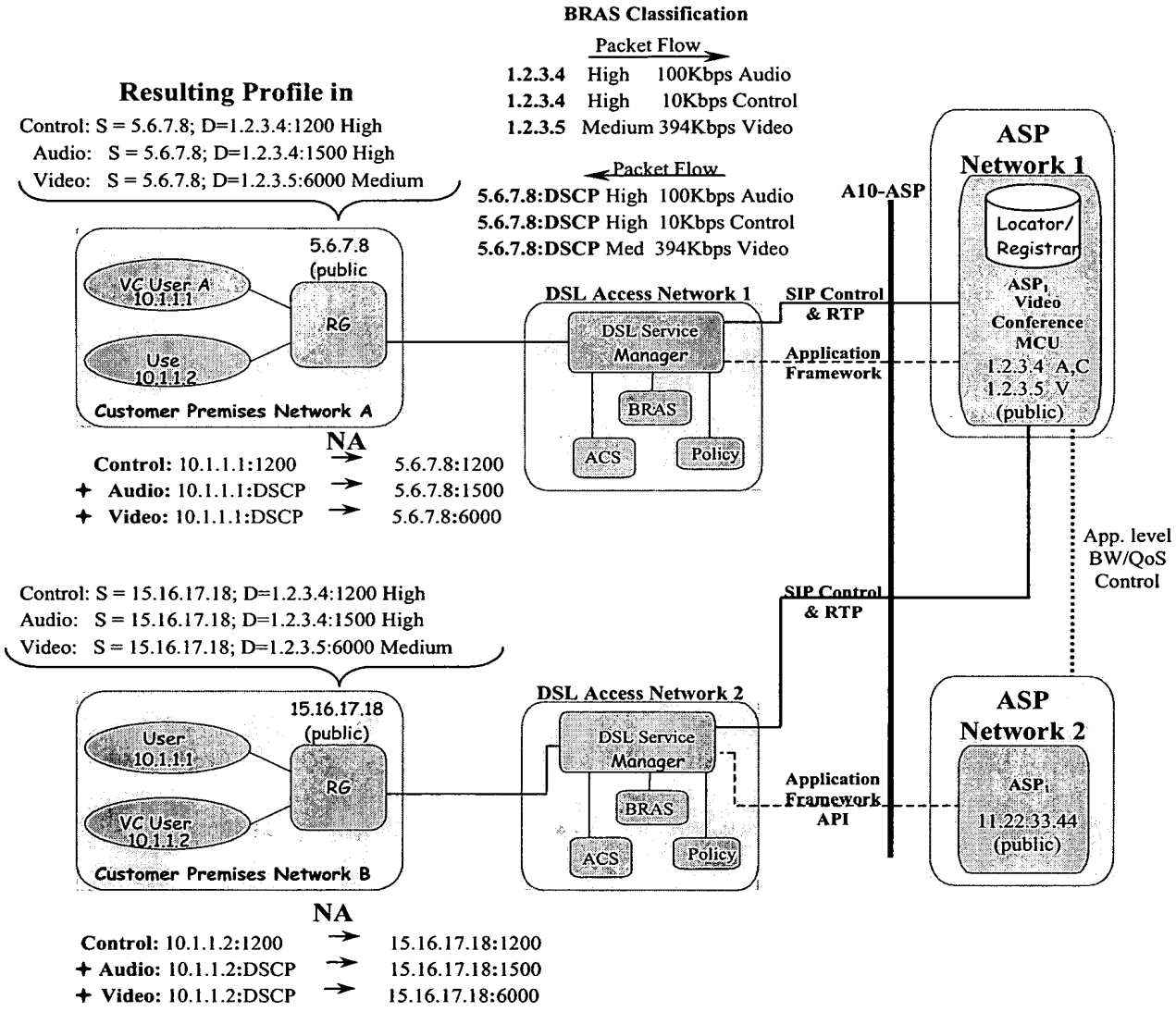

BRAS Classification
Packet Flow
1.2.3.4 High 100Kbps Audio
1.2.3.4 High 10Kbps Control
1.2.3.5 Medium 394Kbps Video
Packet Flow
5.6.7.8:DSCP High 100Kbps Audio
5.6.7.8:DSCP High 10Kbps Control
5.6.7.8:DSCP Med 394Kbps Video
Resulting Profile in
Control: S = 5.6.7.8; D=1.2.3.4:1200 High
Audio: S = 5.6.7.8; D=1.2.3.4:1500 High
Video: S = 5.6.7.8; D=1.2.3.5:6000 Medium
5.6.7.8 (public
VC User A 10.1.1.1
Use 10.1.1.2
RG
Customer Premises Network A
DSL Access Network 1
DSL Service Manager
BRAS
ACS
Policy
SIP Control & RTP
Application Framework
A10-ASP
ASP Network 1
Locator/ Registrar
ASP1 Video Conference MCU
1.2.3.4 A,C
1.2.3.5 V
(public)
NA
Control: 10.1.1.1:1200 → 5.6.7.8:1200
+ Audio: 10.1.1.1:DSCP → 5.6.7.8:1500
+ Video: 10.1.1.1:DSCP → 5.6.7.8:6000
App. level BW/QoS Control
Control: S = 15.16.17.18; D=1.2.3.4:1200 High
Audio: S = 15.16.17.18; D=1.2.3.4:1500 High
Video: S = 15.16.17.18; D=1.2.3.5:6000 Medium
15.16.17.18 (public)
User 10.1.1.1
VC User 10.1.1.2
RG
Customer Premises Network B
DSL Access Network 2
DSL Service Manager
BRAS
ACS
Policy
SIP Control & RTP
Application Framework API
ASP Network 2
ASP2
11.22.33.44
(public)
NA
Control: 10.1.1.2:1200 → 15.16.17.18:1200
+ Audio: 10.1.1.2:DSCP → 15.16.17.18:1500
+ Video: 10.1.1.2:DSCP → 15.16.17.18:6000

FIGURE 28

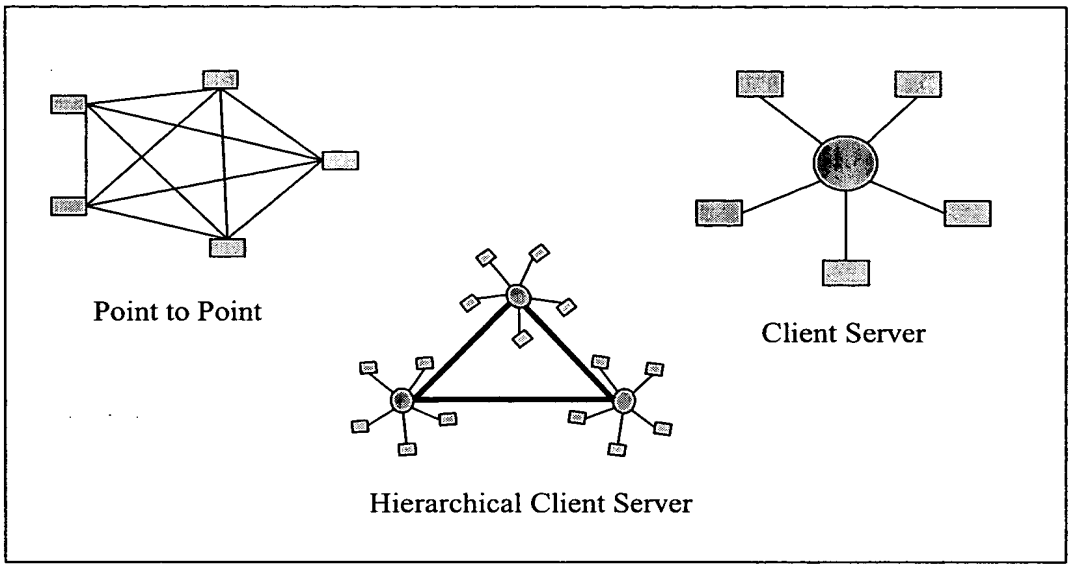


FIGURE 29

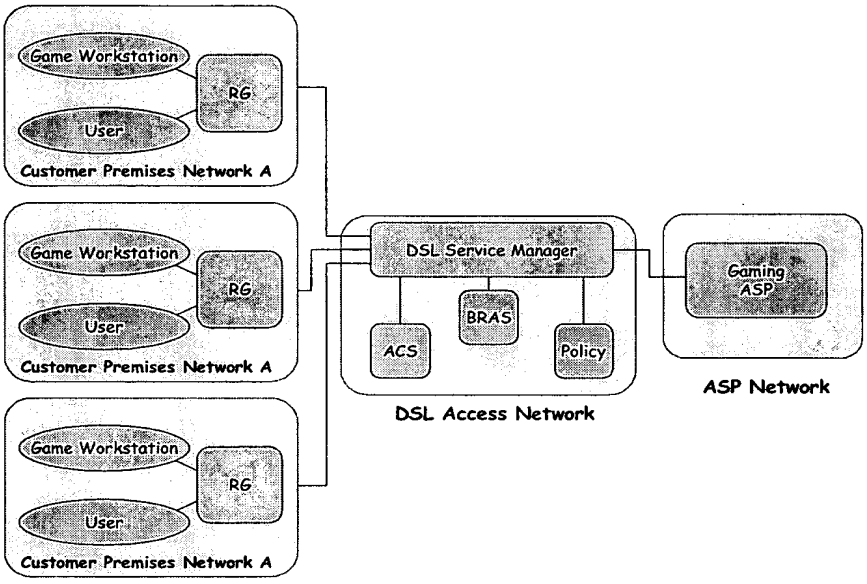

Game Workstation
RG
User
Customer Premises Network A
Game Workstation
RG
User
Customer Premises Network A
Game Workstation
RG
User
Customer Premises Network A
DSL Service Manager
BRAS
ACS
Policy
DSL Access Network
Gaming ASP
ASP Network

FIGURE 30

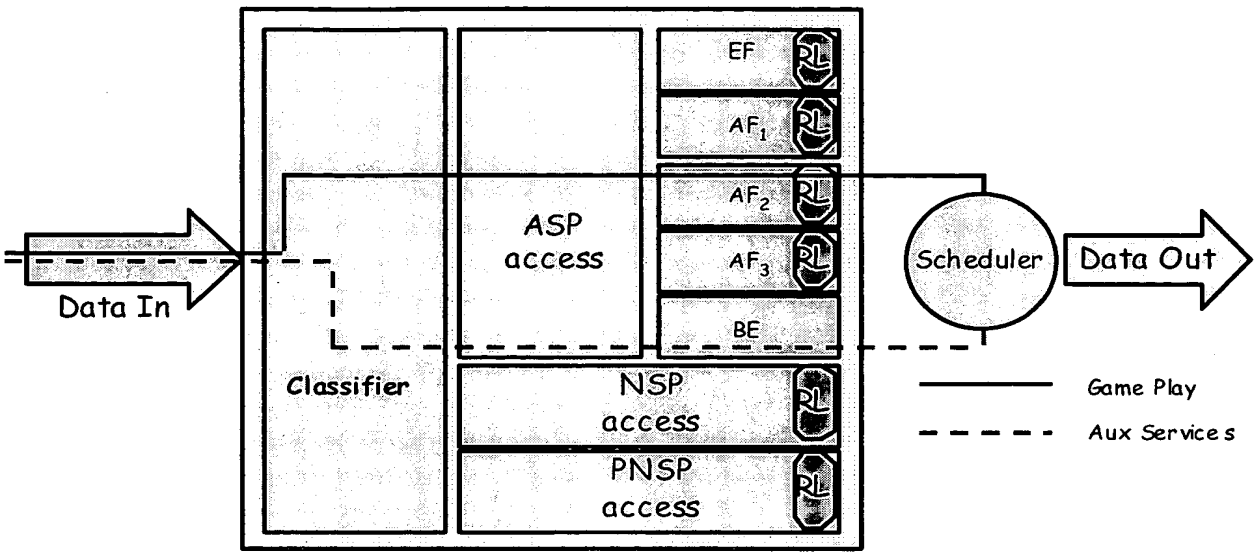
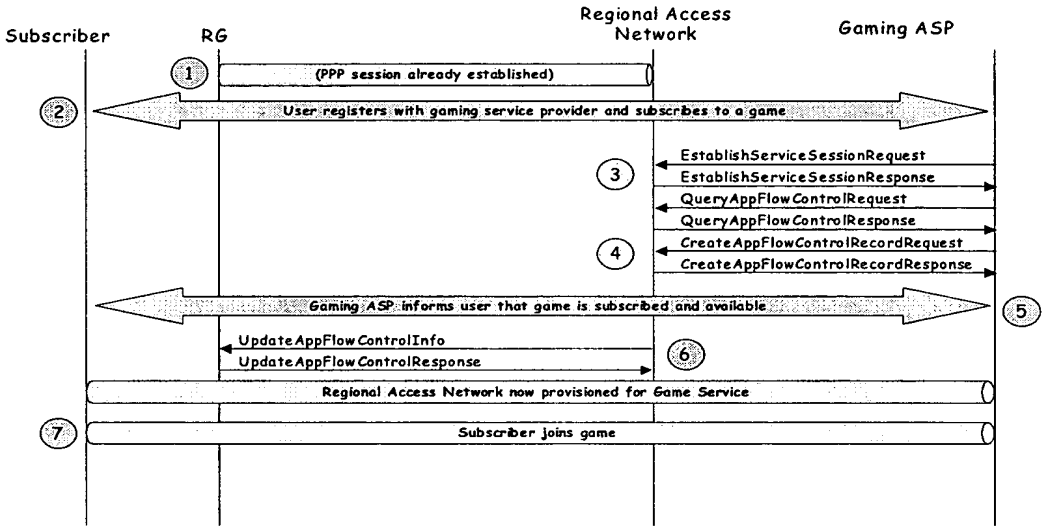

EF
AF1
AF2
AF3
BE
ASP
access
NSP
access
PNSP
access
Classifier
Data In
Scheduler
Data Out
Game Play
Aux Services

FIGURE 31


Subscriber
RG
Regional Access Network
Gaming ASP
1
(PPP session already established)
2
User registers with gaming service provider and subscribes to a game
3
EstablishServiceSessionRequest
EstablishServiceSessionResponse
QueryAppFlowControlRequest
QueryAppFlowControlResponse
4
CreateAppFlowControlRecordRequest
CreateAppFlowControlRecordResponse
Gaming ASP informs user that game is subscribed and available
5
UpdateAppFlowControlInfo
UpdateAppFlowControlResponse
6
Regional Access Network now provisioned for Game Service
7
Subscriber joins game

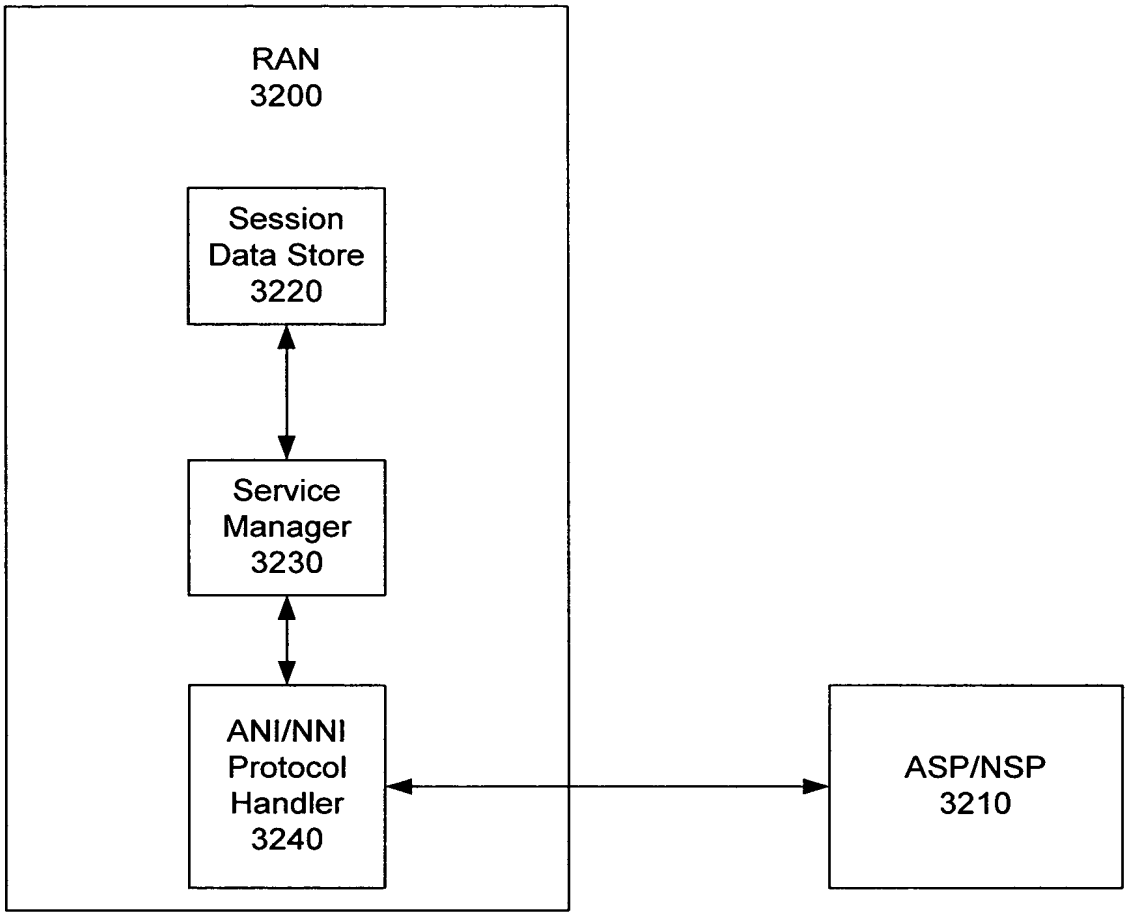

RAN
3200
Session
Data Store
3220
Service
Manager
3230
ANI/NNI
Protocol
Handler
3240
ASP/NSP
3210

Figure 32

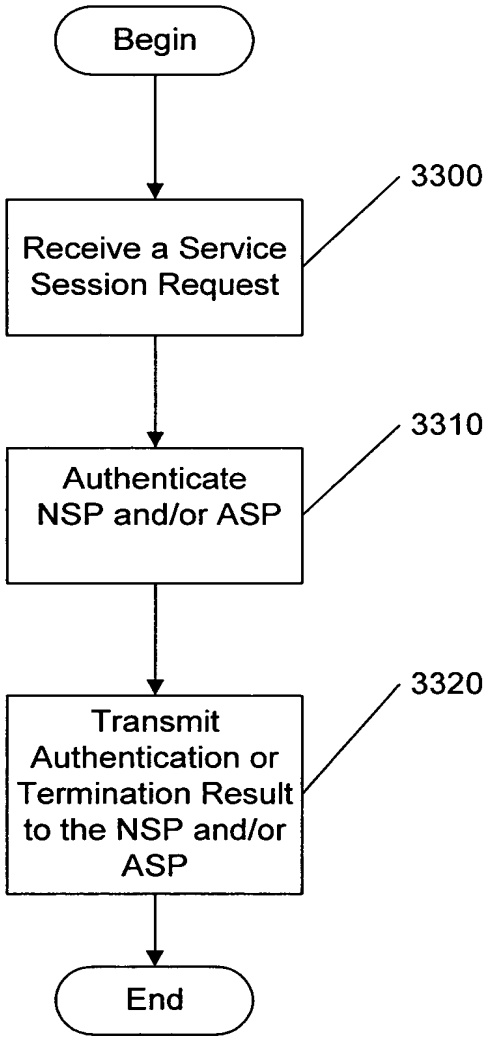

Begin
3300
Receive a Service Session Request
3310
Authenticate NSP and/or ASP
3320
Transmit Authentication or Termination Result to the NSP and/or ASP
End

Figure 33

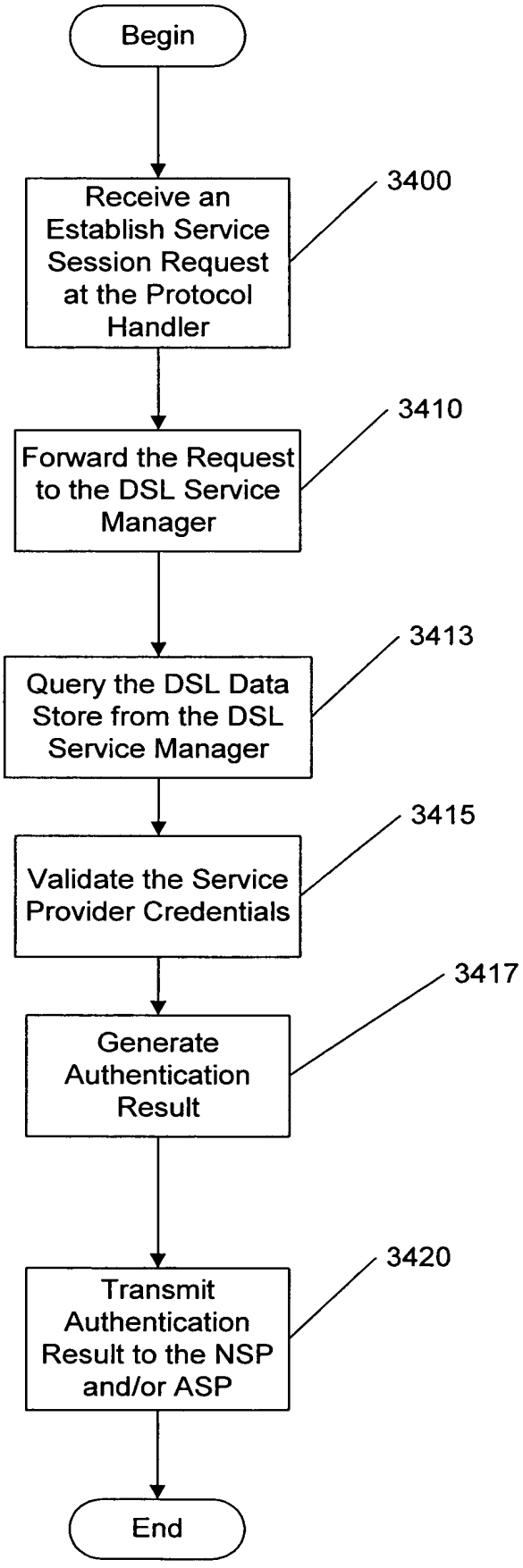

Begin
Receive an Establish Service Session Request at the Protocol Handler
3400
Forward the Request to the DSL Service Manager
3410
Query the DSL Data Store from the DSL Service Manager
3413
Validate the Service Provider Credentials
3415
Generate Authentication Result
3417
Transmit Authentication Result to the NSP and/or ASP
3420
End

Figure 34

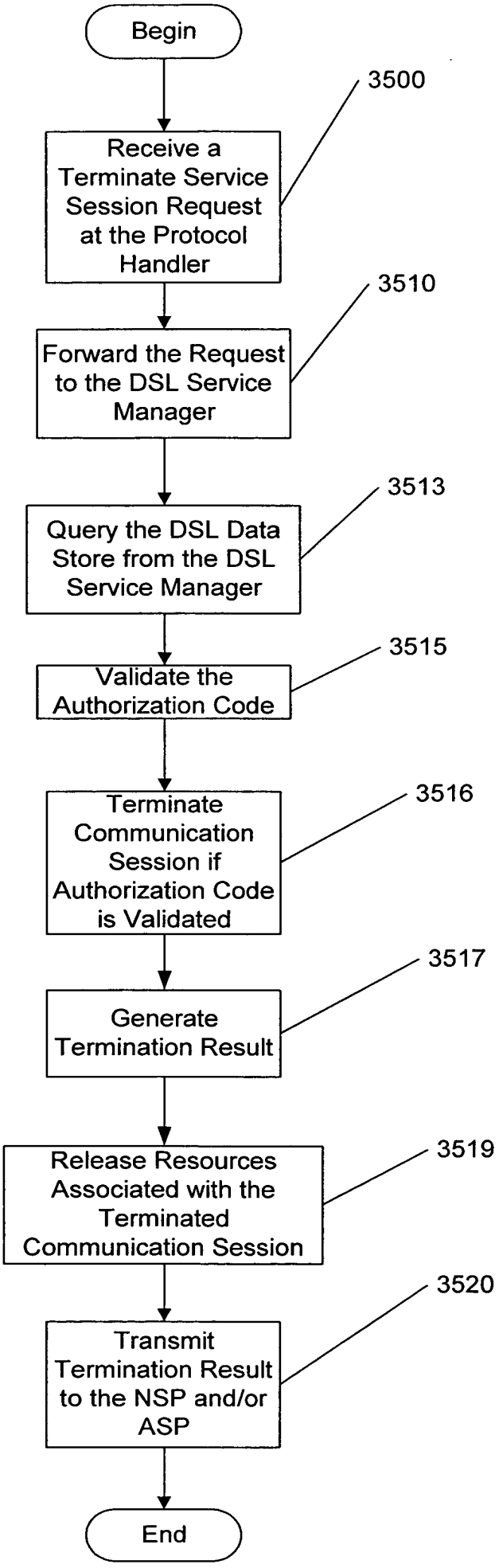

Begin
3500
Receive a Terminate Service Session Request at the Protocol Handler
3510
Forward the Request to the DSL Service Manager
3513
Query the DSL Data Store from the DSL Service Manager
3515
Validate the Authorization Code
3516
Terminate Communication Session if Authorization Code is Validated
3517
Generate Termination Result
3519
Release Resources Associated with the Terminated Communication Session
3520
Transmit Termination Result to the NSP and/or ASP
End

Figure 35